Tending the Commons

Fred Baker
ISOC Chair
Cisco Fellow

The commons

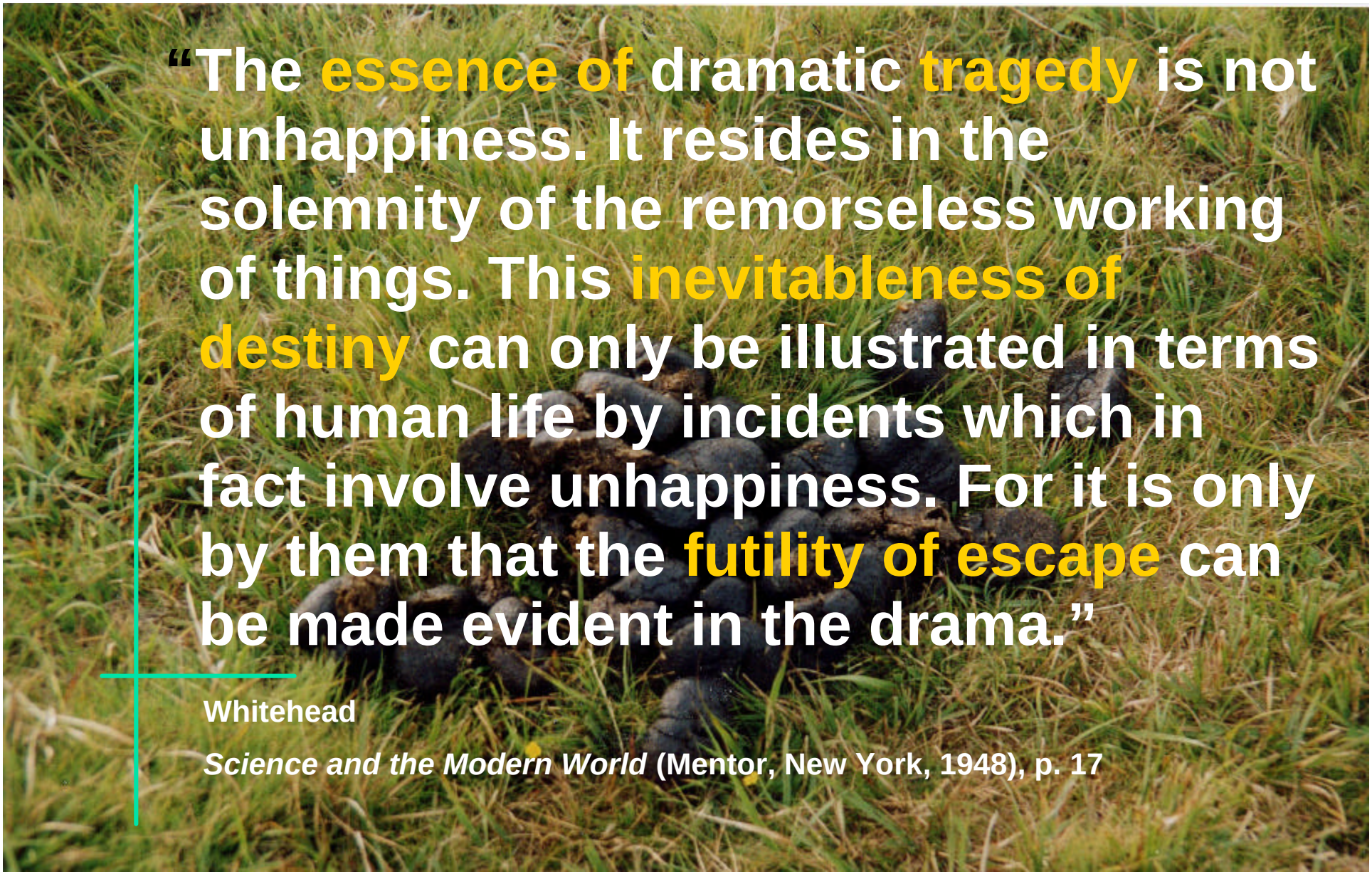
- A region shared by people, who use it to work, live, play, and learn
- A place in which commoners
  - Treat as “held in common”
    (although land is now often privately held, by “lords”)
  - Pasture animals (sheep, cattle, horses)
  - Cut peat
  - Generally used as freely available land

- Photo credits to
  - Arthur Boyt, Davidstow, Cornwall
  - The lords and commoners of Bodmin Moor, Cornwall
    - http://www.bodminmoor.co.uk

The tragedy of the commons

http://dieoff.Org/page95.Htm

- Everyone uses it
  - And benefit from using it well together
- Nobody owns it
  - Each person gains more from overuse than he individually loses
  - Nobody is responsible to maintain it
  - Any problem is someone else's problem


"The essence of dramatic tragedy is not unhappiness. It resides in the solemnity of the remorseless working of things. This inevitableness of destiny can only be illustrated in terms of human life by incidents which in fact involve unhappiness. For it is only by them that the futility of escape can be made evident in the drama."
Whitehead
Science and the Modern World (Mentor, New York, 1948), p. 17

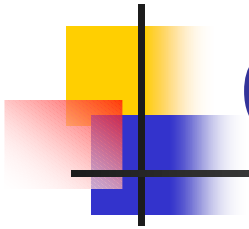
The Internet is a “commons”

- Architecturally:
  - A common medium used by all
- Operationally:
  - A region in which we affect each other

In the Internet, the "tragedy of the commons" is increasingly problematic

File-sharing applications bring legal complaints

- Entertainment industry (RIAA) vs. its market
  - Morpheus/gnutella/etc fail to observe intellectual property rights
  - Industry makes a lot of money from consumers
- file-sharing as a medium
  - Similar to cassette,
  - 1978: viewed as a copyright violation,
  - 2002: viewed as a market
- Is this about copyright, or control?



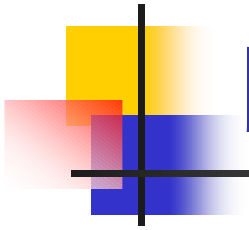
Competing traffic

- Unsolicited commercial messages, viruses, and attacks crowd out useful traffic
  - We’re told that >50% of email volume is now unsolicited commercial advertisements
  - Security concerns crowd out new applications

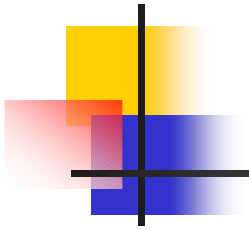
Denial of Service attacks

- Vandalism?
  - Technological “skinheads”
  - “Taggers” leaving graffiti
  - Sometimes outright breaking and entering
- Means of warfare
  - Communications increasingly means survival, in business if not in fact
  - Damaging communications can damage lives or livelihoods

Network design affects behavior



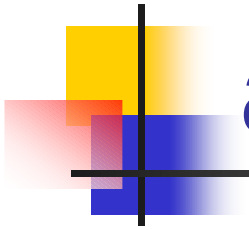
- Poor network and application designs make new application deployment difficult
  - Intrusive middleware
  - Brittle routing
  - Address shortages



IPv4 address space

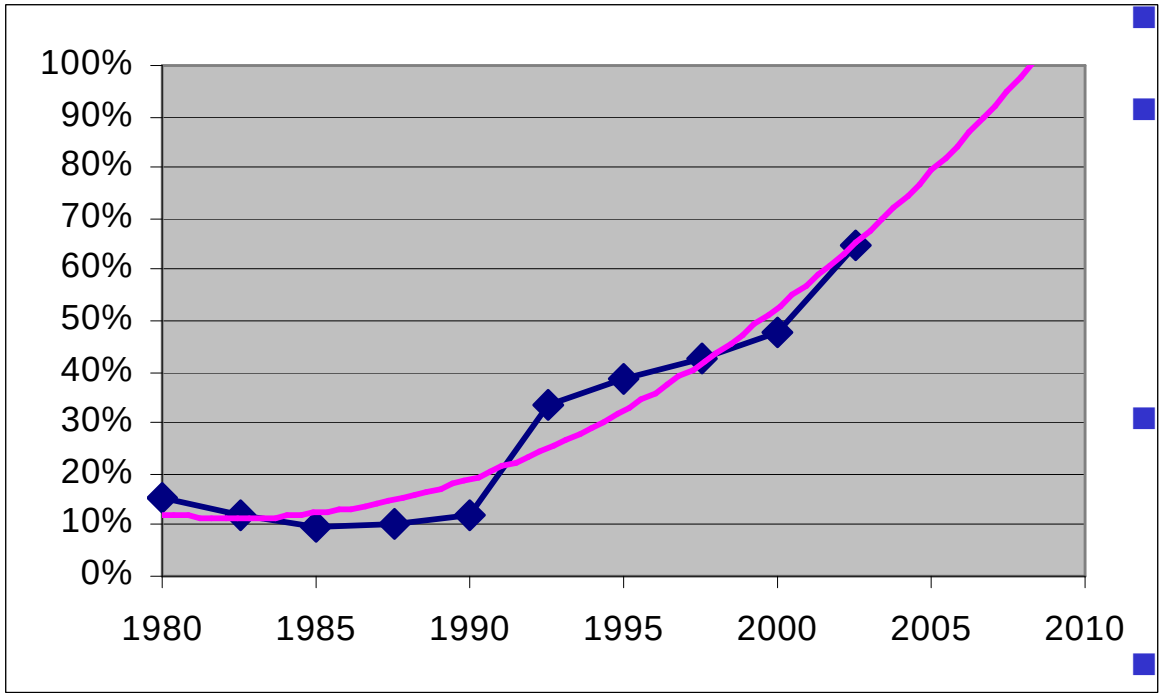
- When do we run out? Pick one:
  - Now
  - Five Years
  - Nineteen
  - Never

BGP announcement of addresses



- Geoff Huston:
  - Today: about 26% of IPv4 space
  - Grows at about 7% annually
  - ~19 years of space to grow in
- http://www.cisco.com/warp/public/759/ipj_2-4.pdf

Address allocations



- Source: RFCs, Scott Marcus, IANA
- Analysis done by Tony Hain

Today: 60% allocated

CERNET

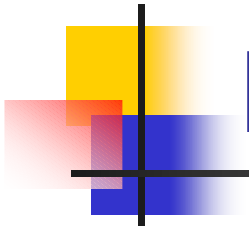
- Could use 72 /8's if they were available
- population is > 320M,

ARIN

- Today manages 75 /8's
- population ~ 300M

Five years for sure;

- But effectively out today

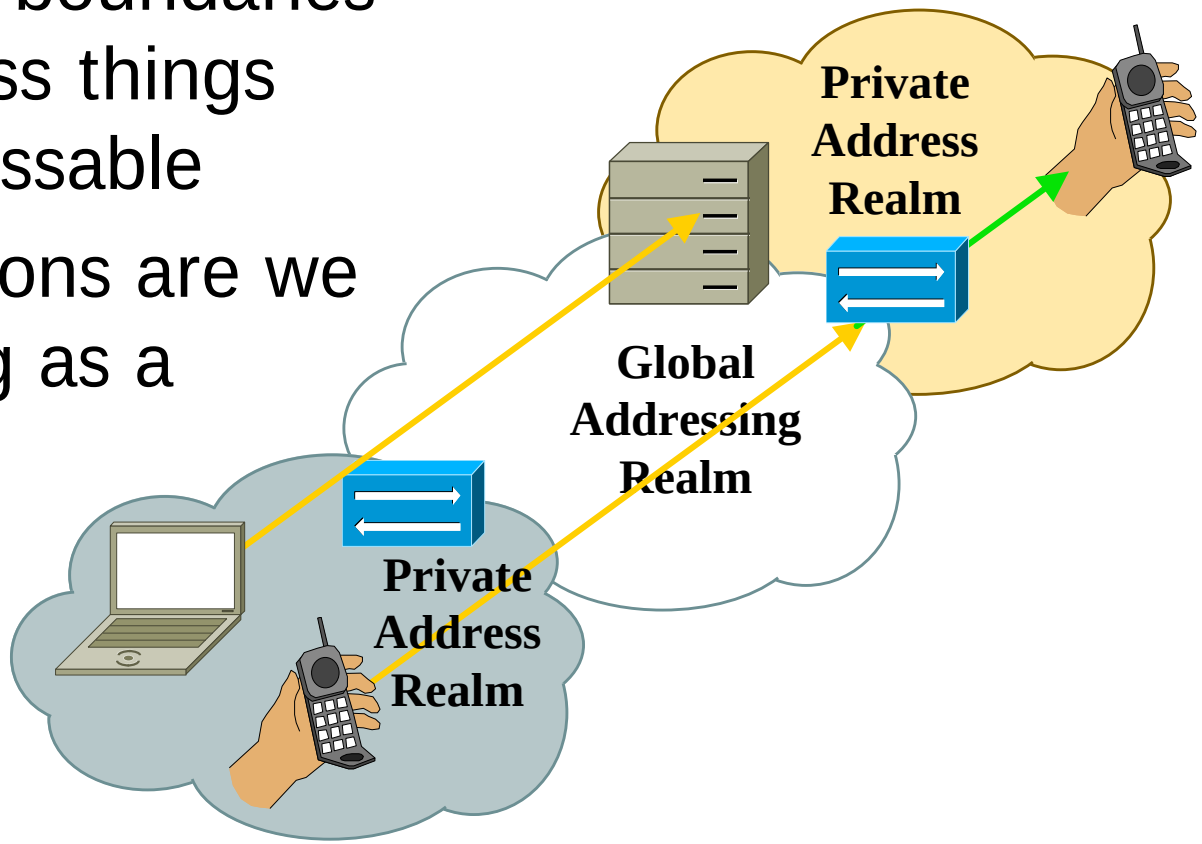


Economic theory

- Supply vs. demand
  - Demand < Supply: commodity valueless
  - Demand > Supply: regulation forced, due to failure of market forces
  - Demand ≈ Supply: market formation, and market work-arounds
- Present state:
  - We pay for addresses
  - Address allocation policy is very restrictive regulation
  - Network Address Translation is a work-around
- Address usage expected to grow until price is too high to pay, ruining the system – but never run out

Applications?

- Applications that cross administrative boundaries have to address things that are addressable
- What applications are we not developing as a result?



What is the way forward?

The paper calls for regulation

- It is about population control
  - Concern about overpopulating the earth
  - Calls for regulation of procreation
- Interesting:
  - Current population growth estimates say that we are having < 2 children per family
  - Only China regulated...

The end to end principle: *an argument for simplicity*

"The function in question can completely and correctly be implemented only with the knowledge and help of the application standing at the end points of the communication system. Therefore, providing that questioned function as a feature of the communication system itself is not possible."

END-TO-END ARGUMENTS IN SYSTEM DESIGN

J.H. Saltzer, D.P. Reed and D.D. Clark

M.I.T. Laboratory for Computer Science, 1981

Another way to say it: Occam's razor

"Entities should not be multiplied unnecessarily," or

"A satisfactory proposition contains no unnecessary complexity."

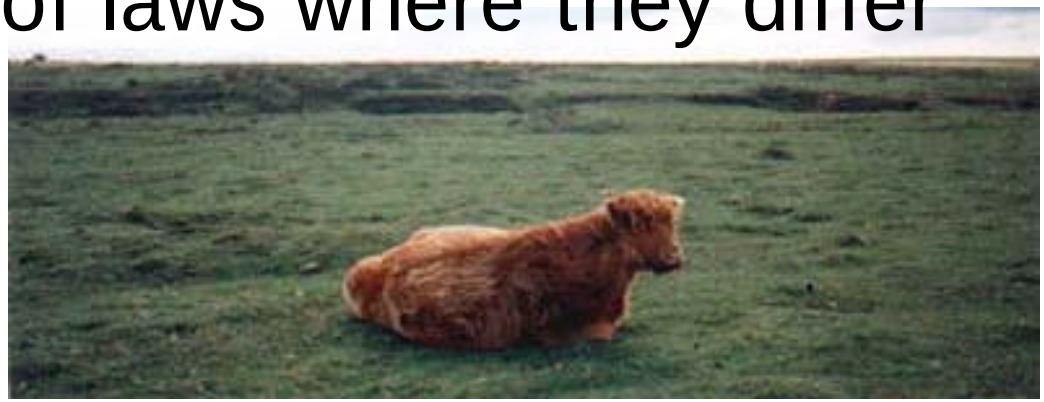
William of Occam

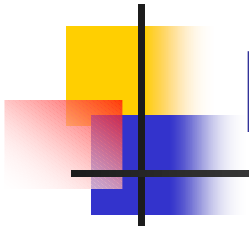
14th Century England

K.I.S.S.

Legal steps that might help

- Application of existing law regarding
  - Copyright
  - Obscenity
  - Harassment
  - Vandalism
- Normalization of laws where they differ unnecessarily

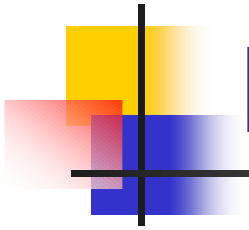




Business steps that might help

- Develop better services based on
  - Secure application design
  - Proper understanding of the problem addressed
- Enable service providers to make money delivering the quality of service we like

Technical steps that might help



- Technical support for enhanced ISP services
  - Real time DOS detection/isolation
- IPv6 deployment for more addresses
- Mail applications that
  - Authenticate senders
  - Obtain permission to send before sending

Social steps that might help

- Dialog
- RIAA vs. market seems like an opportunity to develop new outlets
- Requires each side to
  - Present reasonable requirements
  - Seek in good faith to meet them

The tragedy of the commons

http://dieoff.Org/page95.Htm

- Everyone uses the Internet to communicate
  - And benefit from using it well together
- No one entity owns it
  - Each entity gains more from overuse than it individually loses
  - No one entity is responsible to maintain it
  - Any problem is someone else's problem
- Unless we decide that the problem is ours...
  - Then we can address it

Tending the Commons

Fred Baker
ISOC Chair
Cisco Fellow